CLAIMS

What is claimed is:

1. An isolated DNA molecule comprising a nucleotide sequence that encodes lysine 2,3-aminomutase.

2. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is a clostridial lysine 2,3-aminomutase.

3. The isolated DNA molecule of claim 2, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:2.

4. The isolated DNA molecule of claim 3, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:1.

5. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Escherichia coli* lysine 2,3-aminomutase.

6. The isolated DNA molecule of claim 5, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:4.

7. The isolated DNA molecule of claim 6, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:3.

8. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Haemophilus influenza* lysine 2,3-aminomutase.

9. The isolated DNA molecule of claim 8, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:6.

10. The isolated DNA molecule of claim 9, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:5.

11. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Porphyromonas gingivalis* lysine 2,3-aminomutase.

12. The isolated DNA molecule of claim 11, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:8.

13. The isolated DNA molecule of claim 12, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:7.

14. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Bacillus subtilus* lysine 2,3-aminomutase.

15. The isolated DNA molecule of claim 14, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:10.

16. The isolated DNA molecule of claim 15, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:9.

17. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Deinococcus radiodurans* lysine 2,3-aminomutase.

18. The isolated DNA molecule of claim 17, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:12.

19. The isolated DNA molecule of claim 18, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:11.

20. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Aquifex aeolicus* lysine 2,3-aminomutase.

21. The isolated DNA molecule of claim 20, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:14.

22. The isolated DNA molecule of claim 21, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:13.

23. The isolated DNA molecule of claim 1, wherein the lysine 2,3-aminomutase is an *Treponema pallidum* lysine 2,3-aminomutase.

24. The isolated DNA molecule of claim 23, wherein the lysine 2,3-aminomutase has the amino acid sequence of SEQ ID NO:16.

25. The isolated DNA molecule of claim 24, wherein the nucleotide sequence that encodes the lysine 2,3-aminomutase is SEQ ID NO:15.

26. An expression vector comprising the isolated DNA molecule of claim 1.

27. A cultured host cell comprising the expression vector of claim 26.

28. A cultured host cell of claim 27 wherein the host cell is *E. coli*.

29. A method of producing L-β-lysine, comprising the steps of:

(a) culturing a host cell of claim 27 in the presence of L-lysine, wherein the cultured host cell expresses the lysine 2,3-aminomutase, and

(b) isolating L-β-lysine from the cultured host cells.

30. A method of producing L-β-lysine, comprising the steps of:

(a) incubating L-lysine in a solution containing purified lysine 2,3-aminomutase, and

(b) isolating L-β-lysine from the incubation solution.

31. The method of claim 30, wherein the lysine 2,3-aminomutase has an amino acid sequence selected from the group consisting of (i) SEQ ID NO:4, (ii) SEQ ID NO:6, (iii) SEQ ID NO:8, (iv) SEQ ID NO:10, (v) SEQ ID NO:12, (vi) SEQ ID NO:14, and (vii) SEQ ID NO:16, and (viii) a conservative amino acid variant of any of SEQ ID NOs:2, 4, 6, 8, 10, 12, 14, or 16.

32. The method of claim 31, wherein step (b) further comprises isolating L-β-lysine from L-lysine via chromatography.

33. A method of producing lysine 2,3-aminomutase, comprising the steps of:

(a) culturing a host cell of claim 27, wherein the cultured host cell expresses the lysine 2,3-aminomutase, and

(b) isolating lysine 2,3-aminomutase from the cultured host cells.

34. The method of claim 33, wherein the isolated lysine 2,3-aminomutase has an amino acid sequence selected from the group consisting of (i) SEQ ID NO:2, (ii) SEQ ID NO:4, (iii) SEQ ID NO:6, (iv) SEQ ID NO:8, (v) SEQ ID NO:10, (vi) SEQ ID NO:12, (vii) SEQ ID NO:14, and (viii) SEQ ID NO:16, and (ix) a conservative amino acid variant of any of SEQ ID NOs:2, 4, 6, 8, 10, 12, 14, or 16.

35. A purified preparation of L-β-lysine.